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MACTEC ENVIRONMENTAL RESTORATION SERVICES, LLC

Spectral Gamma-Ray Borehole
Log Data Report

Log Event A

Borehole 10-01-06

Borehole Information

Farm : A	**Tank :** A-101	**Site Number :** 299-E24-70
N-Coord : 41,157	**W-Coord :** 47,809	**TOC Elevation :** 690.62
Water Level, ft : 123.50	**Date Drilled :** 4/6/62	

Casing Record

Type : Steel-welded	Thickness : 0.280	ID, in. : 6
Top Depth, ft. : 0	Bottom Depth, ft. : 125	

Cement Bottom, ft. : 18 **Cement Top, ft. :** 0

Borehole Notes:

Borehole 10-01-06 was originally drilled in April 1962 and was completed at a depth of 75 ft with 6-in. casing. In 1978, the borehole was extended to a depth of 125 ft. While deepening the borehole, the driller's log indicates that the welds on the original casing broke in two places and the entire 75 ft of the casing was replaced (a total of 125 ft of new 6-in. casing). The driller's log indicates that a temporary 8-in. casing was installed to a depth of 18 ft. Drilling continued to a depth of 130 ft and the 6-in. casing was advanced to 125 ft. The bottom 5 ft of the borehole was filled with 9 gal of cement grout. The 8-in. casing was removed and 36 gal of grout was injected into the void space between the permanent 8-in. casing and the 8-in. borehole wall as the casing was retracted.

The casing thickness for the borehole is assumed to be 0.280 in., on the basis of the published thickness for schedule-40, 6-in. casing.

The top of the casing is the zero reference for the log. The casing lip is approximately even with the ground surface.

Equipment Information

Logging System : 2	**Detector Type :** HPGe	**Detector Efficiency:** 35.0 %
Calibration Date : 10/1996	**Calibration Reference :** GJO-HAN-13	**Logging Procedure :** P-GJPO-1783

Logging Information

Log Run Number : 1	**Log Run Date :** 12/03/1996	**Logging Engineer:** Gary Lekvold
Start Depth, ft.: 124.5	**Counting Time, sec.:** 100	**L/R :** L **Shield :** N
Finish Depth, ft. : 54.0	**MSA Interval, ft. :** 0.5	**Log Speed, ft/min.:** n/a

Log Run Number : 2	**Log Run Date :** 12/04/1996	**Logging Engineer:** Gary Lekvold
Start Depth, ft.: 53.0	**Counting Time, sec.:** 100	**L/R :** L **Shield :** N
Finish Depth, ft. : 0.0	**MSA Interval, ft. :** 0.5	**Log Speed, ft/min.:** n/a

Borehole 10-01-06

Log Event A

Logging Operation Notes:

This borehole was logged in two log runs. Because of an operator error, data were not collected over an overlapping interval. Instead of the normal overlap, a 1-ft gap occurred between the two logging runs. The error was not noticed until after the SGLS had demobilized from the site. because there were no man-made radionuclides in the vicinity and the concentration of the natural radionuclides was normal, it was not considered worthwhile to remobilize to the site to collect the 1 ft of overlapping data. The total logging depth achieved by the SGLS was 124.5 ft.

Analysis Information

Analyst : S.D. Barry

Data Processing Reference : MAC-VZCP 1.7.9 Analysis Date : 02/10/1998

Analysis Notes :

The pre- and post-survey field verification spectra for all logging runs met the acceptance criteria established for peak shape and system efficiency. The energy calibration and peak-shape calibration from these spectra were used to establish the peak resolution and channel-to-energy parameters used in processing the spectra acquired during the logging operation.

Casing correction factors for a 0.280-in.-thick steel casing (based on a 6-in., schedule-40 pipe) were applied to the entire logged interval during the analysis process.

Log Plot Notes:

Separate log plots show the man-made and the naturally occurring radionuclides. The natural radionuclides can be used for lithology interpretations. The headings of the plots identify the specific gamma rays used to calculate the concentrations. Uncertainty bars on the plots show the statistical uncertainties for the measurements as 95-percent confidence intervals. Open circles on the plots give the MDL. The MDL of a radionuclide represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.

A combination plot includes the man-made and natural radionuclides, the total gamma derived from the spectral data, and the Tank Farms gross gamma log. The gross gamma plot displays the latest available digital data. No attempt has been made to adjust the depths of the gross gamma logs to coincide with the SGLS data.

Results/Interpretations:

The only man-made radionuclide detected in this borehole was Cs-137. Cs-137 contamination was detected nearly continuously from the ground surface to 13.5 ft, intermittently from 13.5 to 52 ft, and nearly continuously from 52.5 to 59 ft.

The K-40 log plot shows an interval of lower concentrations from approximately 3 to 13 ft. The K-40 log plot shows another region of slightly lower K-40 concentrations between about 55 and 60 ft.

An analysis of the shape factors associated with applicable segments of the spectra was performed. The shape factors provide insights into the distribution of the Cs-137 contamination and into the nature of zones of elevated total count gamma-ray activity not attributable to gamma-emitting radionuclides. The shape factor

Borehole 10-01-06

Log Event A

analysis for the interval from the ground surface to about 4 ft is not valid because of the presence of grout on the outside of the borehole casing. Shape factor analysis results in the rest of the borehole were not interpretable.

Additional information and interpretations of log data are included in the main body of the Tank Summary Data Report for tank A-101.